

## In the Claims

Please cancel claims 5, 10, and 12-16. Please amend claims 1, 7, 17, and 19-20. Please add new claims 21-29. The claims are as follows:

1. (Currently amended) An apparatus comprising:

a chamber adapted for holding a workpiece having a surface layer adapted for being etched; and

a distribution plate including I rings within the distribution plate and around a common point on the distribution plate such that no other ring exists within the distribution plate,

wherein I is an integer of at least 2,

wherein the I rings are denoted as  $R_1, R_2, \dots, R_I$  in order of increasing distance from the common point and consist of  $I_1$  rings of a first type and  $I_2$  rings of a second type such that  $I_1$  is at least 1,  $I_2$  is at least 1, and  $I_1 + I_2 = I$ ,

wherein the I rings collectively comprise N channels and no other channels such that each ring of the I rings comprises at least 2 channels of the N channels,

wherein N is at least  $2 \cdot I$ , wherein the N channels consist of  $N_1$  channels of a first kind within the  $I_1$  rings of the first type and  $N_2$  channels of a second kind within the  $I_2$  rings of the second type such that  $N_1 + N_2 = N$ ,

wherein each channel of the  $N_1$  channels of a first kind are configured to provide a first plurality of channels for providing a first fluid to flow into the chamber at  $[[\text{an}]]$  a constant angle  $\theta_1$  with respect to an exposed surface of the distribution plate,

wherein each channel of the  $N_2$  channels of the second kind are configured to

~~provide and a second plurality of channels for providing~~ a second fluid to flow into the chamber at ~~[[an]]~~ a constant angle  $\theta_2$  with respect to the exposed surface of the distribution plate, and

wherein ~~each angle~~  $\theta_1$  and  $\theta_2$  ~~[[is]]~~ are each at least 45 degrees and less than 90 degrees,

wherein  $\theta_1$  is unequal to  $\theta_2$ , and

wherein the first fluid differs from the second fluid;

a first fluid feed line configured to be connected to a source of the first fluid, wherein the first fluid feed line is fluidically coupled to the  $N_1$  channels of the first kind for providing the first fluid to the  $N_1$  channels of the first kind, and wherein the first fluid feed line is not fluidically coupled to the  $N_2$  channels of the second kind and cannot provide the first fluid to the  $N_2$  channels of the second kind; and

a second fluid feed line configured to be connected to a source of the second fluid and to be fluidically coupled to the  $N_2$  channels of the second kind so as to provide the second fluid to the  $N_2$  channels of the second kind, and wherein the second fluid feed line is not fluidically coupled to the  $N_1$  channels of the first kind and cannot provide the second fluid to the  $N_2$  channels of the first kind.

2. (Canceled)

3. (Previously presented) The apparatus of claim 1, wherein paths of the first plurality of channels and paths of the second plurality of channels originate in an XY plane of the

distribution plate and wherein each angle  $\theta_1$  and  $\theta_2$  is at least 45 degrees and less than 90 degrees with respect to the XY plane and wherein each angle  $\theta_1$  is offset from the XY plane at an offset angle  $\alpha_1$  and  $\beta_1$  with respect to the XY plane, and wherein each angle  $\theta_2$  is offset from the XY plane at an offset angle  $\alpha_2$  and  $\beta_2$  with respect to the XY plane, and wherein  $\alpha_1$ ,  $\beta_1$ ,  $\alpha_2$ , and  $\beta_2$  are selected from the group consisting of from about 0 to -45 and from about 0 to +45 degrees with respect to the XY plane.

4. (Original) The apparatus of claim 1, wherein the distribution plate comprises a material selected from the group consisting of polytetrafluoroethylene, fluorinated ethylene propylene, acetyl homopolymer resin, polyimide, polyetherimide, polyarylate, polycarbonate, and combinations thereof.

5. (Canceled)

6. (Previously presented) The apparatus of claim 1, wherein paths of the fluids through the distribution plate further comprises grooves and wherein a volume of the grooves is greater than a volume of the channels.

7. (Currently amended) The apparatus of claim 1, wherein the rings around the ~~center~~ common point ~~[[of]]~~ on the distribution plate have shapes selected from the group consisting of circles, ellipses, rectangles, squares and combinations thereof.

8. (Original) The apparatus of claim 1, wherein the chamber further comprises a lower annular ring that includes a plurality of holes extending over an exhaust port.

9. (Original) The apparatus of claim 1, wherein the chamber further comprises an upper annular ring, wherein a space is created between an edge of the upper annular ring and a wall of the chamber, and wherein the space restricts a flow of fluids in the chamber.

10. (Canceled)

11. (Original) The apparatus of claim 1, wherein the distribution plate is located from about 1/8 inch to about 3 1/2 inches from a surface of the workpiece.

12-16. (Canceled)

17. (Currently amended) A distribution plate, comprising:

~~a first plurality of channels for providing a first fluid to flow into a chamber at an angle  $\theta_1$  with respect to an exposed surface of the distribution plate; and~~  
~~a second plurality of channels for providing a second fluid to flow into the chamber at an angle  $\theta_2$  with respect to the exposed surface of the distribution plate, wherein the first plurality of channels and the second plurality of channels are arranged in rings around a common point of the distribution plate, and wherein each angle  $\theta_1$  and  $\theta_2$  is at least 45 degrees and less than 90 degrees~~ I rings within the distribution plate and around a common point on the

distribution plate such that no other ring exists within the distribution plate,

wherein I is an integer of at least 3,

wherein the I rings are denoted as  $R_1, R_2, \dots, R_I$  in order of increasing distance from the common point and consist of  $I_1$  rings of a first type and  $I_2$  rings of a second type such that  $I_1$  is at least 1,  $I_2$  is at least 1, and  $I_1 + I_2 = I$ ,

wherein the I rings collectively comprise N channels and no other channels such that each ring of the I rings comprises at least 2 channels of the N channels,

wherein N is at least  $2 \cdot I$ ,

wherein the N channels consist of  $N_1$  channels of a first kind within the  $I_1$  rings of the first type and  $N_2$  channels of a second kind within the  $I_2$  rings of the second type such that  $N_1 + N_2 = N$ ,

wherein each channel of the  $N_1$  channels of a first kind are configured to provide a first fluid to flow into a chamber at a constant angle  $\theta_1$  with respect to an exposed surface of the distribution plate,

wherein each channel of the  $N_2$  channels of the second kind are configured to provide a second fluid to flow into the chamber at a constant angle  $\theta_2$  with respect to the exposed surface of the distribution plate,

wherein the chamber is adapted for holding a workpiece having a surface layer adapted for being etched,

wherein  $\theta_1$  and  $\theta_2$  are each at least 45 degrees and less than 90 degrees,

wherein  $\theta_1$  is unequal to  $\theta_2$ ,

wherein the first fluid differs from the second fluid, and

wherein three consecutive rings of the I rings are denoted as rings  $R_K$ ,  $R_{K+1}$ ,  $R_{K+2}$  and are arranged in an alternating pattern such that either rings  $R_K$  and  $R_{K+2}$  are rings of the first type and ring  $R_{K+1}$  is a ring of the second type or rings  $R_K$  and  $R_{K+1}$  are rings of the second type and ring  $R_{K+2}$  is a ring of the first type, subject to K being selected from the group consisting of 1, 2, ... , and I-2.

18. (Canceled)

19. (Currently amended) The distribution plate of claim 17, wherein paths of the first plurality of channels and the second plurality of channels originate in an XY plane of the distribution plate, and wherein each angle  $\theta_1$  and  $\theta_2$  is at least 45 degrees and less than 90 degrees with respect to the XY plane and wherein each angle  $\theta_1$  is offset from the XY plane at an offset angle  $\alpha_1$  and  $\beta_1$  with respect to the XY plane, and wherein each angle  $\theta_2$  is offset from the XY plane at an offset angle  $\alpha_2$  and  $\beta_2$  with respect to the XY plane, and wherein  $\alpha_1$ ,  $\beta_1$ ,  $\alpha_2$ , and  $\beta_2$  are selected from the group consisting of from about 0 to -45 and from about 0 to +45 degrees with respect to the XY plane.

20. (Currently amended) The distribution plate of claim 17, ~~wherein the first fluid is provided to the first plurality of channels and the second fluid is provided to the second plurality of channels without premixing of the first and second fluids~~

wherein I is at least 4,

wherein if I is an odd positive integer then the  $I_1$  rings of the first type consist of  $R_1, R_3, \dots$

,  $R_I$  and the  $I_2$  rings of the second type consist of  $R_2, R_4, \dots, R_{I-1}$ , and

wherein if  $I$  is an even positive integer then the  $I_1$  rings of the first type consist of  $R_1, R_3,$   
 $\dots, R_{I-1}$  and the  $I_2$  rings of the second type consist of  $R_2, R_4, \dots, R_I$ .

21. (New) The apparatus of claim 1,

wherein the first fluid feed line is connected to the source of the first fluid, and

wherein the second fluid feed line is connected to the source of the second fluid.

22. (New) The apparatus of claim 21,

wherein the first fluid is within the  $N_1$  channels of the first kind and not within the  $N_2$   
channels of the second kind, and

wherein the second fluid is within the  $N_2$  channels of the second kind and not within the  
 $N_2$  channels of the first kind.

23. (New) The apparatus of claim 22,

wherein the first fluid comprises ammonia gas and the second fluid comprises hydrogen  
fluoride gas, and

wherein the first fluid and the second fluid are adapted to react inside the chamber to  
form a self-limiting etchable layer on a portion of the adapted surface layer of the workpiece.

24. (New) The apparatus of claim 1, wherein three consecutive rings of the  $I$  rings are denoted as  
rings  $R_K, R_{K+1}, R_{K+2}$  and are arranged in an alternating pattern such that either rings  $R_K$  and  $R_{K+2}$

are rings of the first type and ring  $R_{K+2}$  is a ring of the second type or rings  $R_K$  and  $R_{K+2}$  are rings of the second type and ring  $R_{K+2}$  is a ring of the first type, subject to  $K$  being selected from the group consisting of 1, 2, ... , and  $I-2$ .

25. (New) The apparatus of claim 24,

wherein the first fluid feed line is connected to the source of the first fluid,

wherein the second fluid feed line is connected to the source of the second fluid,

wherein the first fluid is within the  $N_1$  channels of the first kind and not within the  $N_2$  channels of the second kind, and

wherein the second fluid is within the  $N_2$  channels of the second kind and not within the  $N_2$  channels of the first kind.

26. (New) The apparatus of claim 25,

wherein the first fluid comprises ammonia gas and the second fluid comprises hydrogen fluoride gas, and

wherein the first fluid and the second fluid are adapted to react inside the chamber to form a self-limiting etchable layer on a portion of the adapted surface layer of the workpiece.

27. (New) The apparatus of claim 24,

wherein  $I$  is at least 4,

wherein if  $I$  is an odd positive integer then the  $I_1$  rings of the first type consist of  $R_1, R_3, \dots, R_I$  and the  $I_2$  rings of the second type consist of  $R_2, R_4, \dots, R_{I-1}$ , and



wherein if  $I$  is an even positive integer then the  $I_1$  rings of the first type consist of  $R_1, R_3, \dots, R_{I-1}$  and the  $I_2$  rings of the second type consist of  $R_2, R_4, \dots, R_I$ .

28. (New) The apparatus of claim 27,

wherein the first fluid feed line is connected to the source of the first fluid,

wherein the second fluid feed line is connected to the source of the second fluid,

wherein the first fluid is within the  $N_1$  channels of the first kind and not within the  $N_2$  channels of the second kind, and

wherein the second fluid is within the  $N_2$  channels of the second kind and not within the  $N_2$  channels of the first kind.

29. (New) The apparatus of claim 28,

wherein the first fluid comprises ammonia gas and the second fluid comprises hydrogen fluoride gas, and

wherein the first fluid and the second fluid are adapted to react inside the chamber to form a self-limiting etchable layer on a portion of the adapted surface layer of the workpiece.